

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Fuel Cells

11/2002



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SMALL-SCALE LOW-COST SOLID OXIDE FUEL CELL POWER SYSTEM

Project Description

Siemens Westinghouse Power Corporation (SWPC), a world leader in tubular solid oxide fuel cell technology, is developing a low-cost, modular, high-efficiency 7- to 10-kilowatt solid oxide combined heat and power system for residential applications, and a 3- to 10-kilowatt auxiliary power unit for automotive applications. During this 10-year, 3-phase project, SWPC will reduce the cost barriers, and resolve the technical issues to commercialize a seal-less planar solid oxide fuel cell design for use in residential and remote power systems, or auxiliary power units (APUs) for transportation that can operate at 45 percent efficiency at a factory cost of \$400/kW.

Project Goals

With an eye toward high-volume commercial manufacture, Phase I work for this project will improve upon a unique cylindrical closed-end tubular cell and seal-less generator module (stack) design developed by SWPC. This current conceptual design costs \$1500/kWe, and includes a natural gas desulfurization system, in-stack reformer, a jet pump for spent fuel recirculation, high-purity insulation boards, and a relatively low efficiency power conditioning system. Issues with this configuration are being addressed to lower production costs to the Phase I project interim goal of \$800/kWe, and improve the high power density seal-less planar cell geometry by using low-cost materials capable of maintaining high voltage and high current density at lower temperatures. The sulfur tolerance and on-cell reformation features will also be improved to reduce module and balance of plant costs, as well as system maintenance. Phase II of this project will continue cost reductions and improve technologies to achieve \$600/kW design; Phase III will further reduce manufacturing costs and improve efficiency to achieve a \$400/kW design for use in residential, remote, small stationary, and transportation applications.



5 kW SOFC Power System Proof-of-Concept

Courtesy of Siemens Westinghouse Power Corporation

PRIMARY PROJECT PARTNERS

Siemens Westinghouse Power Corporation
Pittsburgh, PA

Fuel Cell Technologies, Ltd.
Ontario, Canada

COST SHARING

DOE	\$47,800,000
Non-DOE	\$32,800,000

STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng

CUSTOMER SERVICE

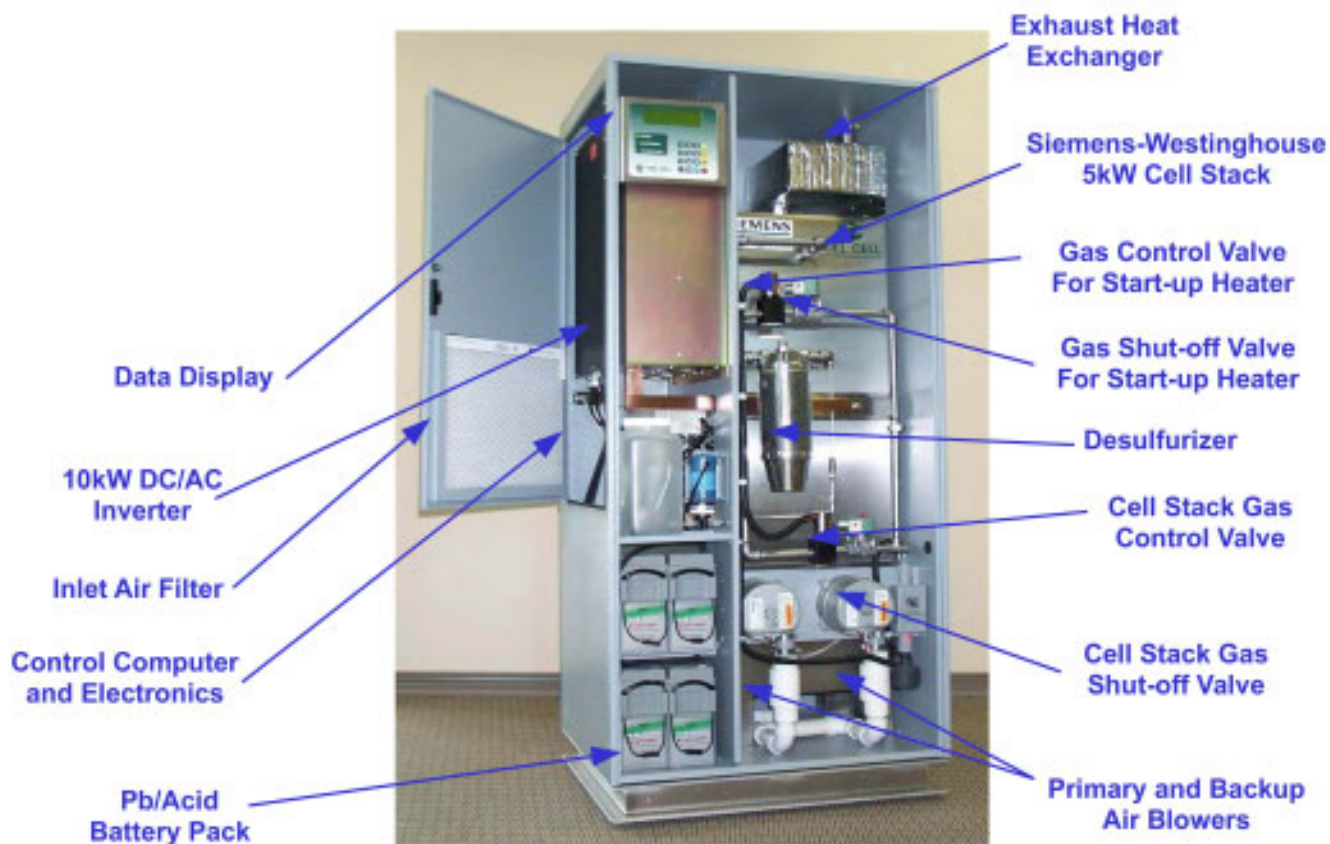
800-553-7681

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Project partner, Fuel Cell Technologies (FCT) will develop the overall balance of plant to simplify the architectural design and logic to facilitate control of a modular, low-cost SOFC system. FCT will also study the prototype system to optimize and improve subsystem operation, enhance reliability, and reduce overall system cost.

Benefits

The solid oxide fuel cell is one of the cleanest, most efficient power generating technologies in development. Operating on SOFCs, small scale power systems situated near the customer—a concept called distributed generation—is fast reaching maturity. These modular power systems are designed to suit the varying needs of commercial, industrial, and residential markets, such as hospitals, shopping centers, apartment complexes—even automobiles—to provide clean, affordable electricity.



Courtesy of Siemens Westinghouse Power Corporation

5 kW Generator - Engineering Mock-up Unit